UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/546,494	04/10/2000	Ulf Ahlfors	6563/54132 (3964-11)	3411

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EXAMINER
NG, CHRISTINE Y

ART UNIT	PAPER NUMBER
2663	11

DATE MAILED: 03/08/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

	Application No.	Applicant(s)
Office Action Summary	09/546,494	AHLFORS ET AL.
	Examiner	Art Unit
	Christine Ng	2663

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>07 January 2004</u>.

2a)☒ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-54</u> is/are pending in the application.

    4a) Of the above claim(s) <u>26,27,53 and 54</u> is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) <u>1-4,7,11,18,21,28-31,34,38,45 and 48</u> is/are rejected.

7)☒ Claim(s) <u>5,6,8-10,12-17,19,20,22-25,32,33,35-37,39-44,46,47 and 49-52</u> is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on <u>10 April 2000</u> is/are: a)☒ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)
2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3)☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5)☐ Notice of Informal Patent Application (PTO-152)
6)☐ Other: _____.

DETAILED ACTION

Claim Objections

1.   Claims 3 and 30 are objected to because of the following informalities:

a. In claim 3 line 2, there should be no terms in parenthesis.

b. In claim 30 line 2, there should be no terms in parenthesis.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

2.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that

form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3.   Claims 1, 2, 28 and 29 are rejected under 35 U.S.C. 102(e) as being as being

unpatentable over U.S. Patent No. 6,570,883 to Wong.

Referring to claims 1 and 28, Wong discloses in Figures 1 and 2 a method for

bandwidth scheduling in a switch (Figure 1, Element 1) comprising a switching fabric

(Figure 1, Element 12) and a bandwidth scheduler (Figure 2, Element 22) located

before any queue (Figure 2, Elements 23-25) of the switch (Figure 1, Element 1). Refer

to Column 3, lines 52-55; Column 4, lines 1-5 and Column 6, lines 26-57. The method

comprises receiving a stream of data (Figure 1, Elements 9-11) from the switching

fabric (Figure 1, Element 12). The switching system (Figure 1, Element 12) switches

the traffic flows (Figure 1, Elements 9-11) from ports A6, B7 and C8 and directs them to

port D. Refer to Column 6, lines 38-41. The method also comprises subjecting each

data packet of the stream (Figure 1, Elements 9-11) to a decision making algorithm in

the bandwidth scheduler (Figure 2, Element 22) resulting in that the data packet is

accepted or rejected before it enters any queue (Figure 2, Elements 23-25) of the switch

(Figure 1, Element 1). The bandwidth scheduler (Figure 2, Element 22) handles all

arriving packets. When an arriving packet arrives at a flow queue F[I] (Figure 3, Step

30), the bandwidth scheduler (Figure 2, Element 22) determines if the flow queue F[I] is

full (Figure 3, Step 31). If the flow queue F[I] is full, the packet is dropped (Figure 3,

Step 39), otherwise the packet is stored in flow queue F[I] (Figure 3, Step 32). Refer to

Column 7, lines 39-51.

Although the disclosed invention does not specifically mention that a stream of

data is subjected to a decision making algorithm resulting in that the stream is accepted

or rejected, a switch always handles a stream of data packets since a source sends a

flow of data packets, not just a single packet, to a destination. Furthermore, "a traffic

flow is referred to as a stream of packets" (Column 4, lines 20-21).

Referring to claims 2 and 29, Wong discloses in Figures 2 and 3 that the stream

of data includes identifiable data packets. "A traffic flow is referred to as a stream of

packets" (Column 4, lines 20-21). The method includes subjecting each data packet to

a decision making algorithm in the bandwidth scheduler (Figure 2, Element 22) resulting

in that the data packet is accepted or rejected. The bandwidth scheduler (Figure 2,

Element 22) handles all arriving packets. When an arriving packet arrives at a flow

queue F[I] (Figure 3, Step 30), the bandwidth scheduler (Figure 2, Element 22)

determines if the flow queue F[I] is full (Figure 3, Step 31). If the flow queue F[I] is full,

the packet is dropped (Figure 3, Step 39), otherwise the packet is stored in flow queue

F[I] (Figure 3, Step 32). Refer to Column 7, lines 39-51.

Claim Rejections - 35 USC § 103

4.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

5.   Claims 3 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over

U.S. Patent No. 6,570,883 to Wong in view of U.S. Patent No. 6,144,636 to Aimoto et

al.

Wong does not disclose that the data packets contain information about their flow

identity, namely port number and traffic class.

Aimoto et al teach that a cell, having been inputted into a switch, is converted

into the format of an internal cell by a header conversion circuit (Figure 1, Element 132).

As shown in Figure 2C, the internal cell format includes output port information (Element

221) and traffic class information (Element 222). Based on this information, the

crossbar switch circuit (Figure 1, Element 105) can transfer the cell to the appropriate

output buffer control circuit (Figure 1, Element 107). Therefore, it would have been

obvious to one having ordinary skill in the art at the time the invention was made to

include that the data packet contains flow identity information, namely the port number

and traffic class; the motivation being so that the data packet can be routed to its

appropriate output port based on its corresponding input port and traffic class since data

flows of different traffic classes require different quality of service parameters.

6.   Claims 4, 18, 31, and 45 are rejected under 35 U.S.C. 103(a) as being

unpatentable over U.S. Patent No. 6,570,883 to Wong in view of U.S. Patent No.

6,144,636 to Aimoto et al, and in further view of U.S. Patent No. 6,628,609 to Chapman

et al.

Referring to claims 4 and 31, Wong and Aimoto et al do not include that a limit is

set on the maximum accepted bandwidth per port.

Chapman et al disclose in Figure 4 that each port is assigned a maximum

bandwidth. Certain traffic classes, after using up its reserved bandwidth, are able to

compete with other permitted classes for any available bandwidth from the port if they

have more traffic to send. Refer to Column 9, lines 37-42. In the case that separate

traffic classes are competing for spare bandwidth, each class will be limited by the

maximum allocated bandwidth settings of each port, thus allowing fair share of

bandwidth among ports of a switch. Refer to Column 13, lines 4-20. Therefore, it would

have been obvious to one having ordinary skill in the art at the time the invention was

made to assign a maximum accepted bandwidth per port; the motivation being to allow

fair share of bandwidth among ports of a switch, thereby preventing a particularly active

traffic flow traveling through a port to utilize all the available bandwidth.

Referring to claims 18 and 45, Wong and Aimoto et al do not include that if one

traffic class is particularly active, it is forced to give up part of its accepted bandwidth.

Chapman et al disclose a related example of a control mechanism. A traffic class (C2) is utilizing 4 Mb/s of bandwidth, which is over its associated port's (Port A) minimum allocated bandwidth of 1 Mb/s, to transmit upstream data to Port A. Another node needs to transmit downstream data to Port A, so C2 is forced to restrict its data rate to Port A's minimum allocated bandwidth. Refer to Column 22, lines 3-26. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to include that if a traffic class becomes particularly active, it must be forced to give up some of its accepted bandwidth; the motivation being that this prevents active traffic flows from utilizing all the available bandwidth, thereby allowing less active traffic flows to achieve their guaranteed minimum bandwidth.

7.   Claims 7 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,570,883 to Wong in view of U.S. Patent No. 6,144,636 to Aimoto et al in view of U.S. Patent No. 6,628,609 to Chapman et al, and in further view of U.S. Patent No. 6,292,465 to Vaid et al.

Wong, Aimoto et al and Chapman et al do not include that there is a maximum accepted bandwidth per traffic class.

Vaid et al disclose that one of the traffic policies includes granting classes "a limit on the total bandwidth used by the class" (Column 13, lines 45-46). When traffic classes are competing for available bandwidth after they have used up all of their reserved bandwidth, a maximum allocated bandwidth prevents a particularly aggressive traffic flow from utilizing too much of the spare bandwidth. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made

to include a maximum accepted bandwidth per traffic class; the motivation being that this allows fair share of spare bandwidth, thereby preventing aggressive traffic flows from utilizing too much of the available bandwidth. This also helps to control traffic behavior since higher priority traffic classes can be assigned a higher maximum bandwidth allocation.

8.   Claims 11 and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,570,883 to Wong in view of U.S. Patent No. 6,144,636 to Aimoto et al, and in further view of U.S. Patent No. 6,292,465 to Vaid et al.

Wong and Aimoto et al do not include that each traffic class is guaranteed a bandwidth up to a limit.

Vaid et al disclose that one of the traffic policies includes "granting classes a minimum bandwidth in the presence of congestion or competition" (Column 13, lines 41-43). In case of congestion, each traffic class is guaranteed a reserved amount of bandwidth. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to guarantee each traffic class a bandwidth up to a limit; the motivation being that this guarantees each traffic class a certain amount of bandwidth even in times of congestion, thereby preventing aggressive traffic flows from utilizing all of the available bandwidth. This also helps to control traffic behavior because high priority or critical traffic flows can be guaranteed a minimum bandwidth allocation in case of congestion.

9.   Claims 21 and 48 are rejected under 35 U.S.C. 103(a) as being unpatentable

over U.S. Patent No. 6,570,883 to Wong in view of U.S. Patent No. 6,144,636 to Aimoto

et al, and in further view of U.S. Publication No. 2002/0097736 to Cohen.

Wong and Aimoto et al do not disclose that flows are grouped together by means

of a hash function into a set of flow groups.

Cohen discloses in Figure 1 that flows to a processor (Element 50) are grouped

together by means of a hash function into a set of flow groups. The use of the hash

function allows the system to "distribute the flows, making sure that packets within the

same flow are sent to the same processor so that the original packet order in each flow

is maintained" and that different flows are sent to different processors (Element 50).

Refer to Paragraph 0013. The hash function is used because "it distributes packets

evenly among the processors in response to flow information such as the

source/destination address, source/destination port and the protocol" (Paragraph 0042).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the

invention was made to include that flows are grouped together by means of a hash

function into a set of flow groups; the motivation being that the hash function allows for

flows of a common source and destination to be grouped together and distributed

evenly among its destination points in response the flow information.

Allowable Subject Matter

10.   Claims 5, 6, 8-10, 12-17, 19, 20, 22-25, 32, 33, 35-37, 39-44, 46, 47 and 49-52

are objected to as being dependent upon a rejected base claim, but would be allowable

if rewritten in independent form including all of the limitations of the base claim and any
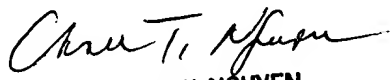
intervening claims.

Conclusion

11.   Applicant's arguments with respect to claims 1-4, 7, 11, 18, 28-31, 34, 38 and 45

have been considered but are moot in view of the new ground(s) of rejection.

12.   Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Christine Ng whose telephone number is (703) 305-

8395. The examiner can normally be reached on M-F; 8:00 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Nguyen Chau can be reached on (703) 308-5340. The fax phone number

for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the

Patent Application Information Retrieval (PAIR) system. Status information for

published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free).

C. Ng   *CN*
February 26, 2004

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